Large Scale Reduction of Graphite Oxide

Completed Technology Project (2014 - 2015)

Project Introduction

This project seeks to develop an optical method to reduce graphite oxide into graphene efficiently and in larger formats than currently available. Current reduction methods are expensive, time-consuming or restricted to small, limited formats. Graphene has potential uses in ultracapacitors, energy storage, solar cells, flexible and light-weight circuits, touch screens, and chemical sensors. In addition, graphite oxide is a sustainable material that can be produced from any form of carbon, making this method environmentally friendly and adaptable for in-situ reduction.

We plan to expand the existing collimated laser beam used in the reduction of graphite oxide into graphene to cover an area of 30 cm x 30 cm. The laser power output and scan rate will be experimentally modified to determine the optimum values for the even reduction of the graphite oxide film. Samples will the examined with XPS and Raman spectroscopy to determine the level of graphene production and its homogeneity.

Anticipated Benefits

High energy density devices produced with this technology will benefit all future funded NASA exploration missions.

Graphene-based supercapacitors made possible with this technology will benefit NASA planetary exploration missions, NASA human exploration missions, NASA aeronautics.

Graphene-based supercapacitors with high energy densities and power densities made possible with this technology will benefit the commercial space industry.

Graphene-based supercapacitors with high energy densities and power densities made possible with this technology will benefit other agencies.

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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Kennedy Space Center (KSC)

Responsible Program:

Center Innovation Fund: KSC CIF

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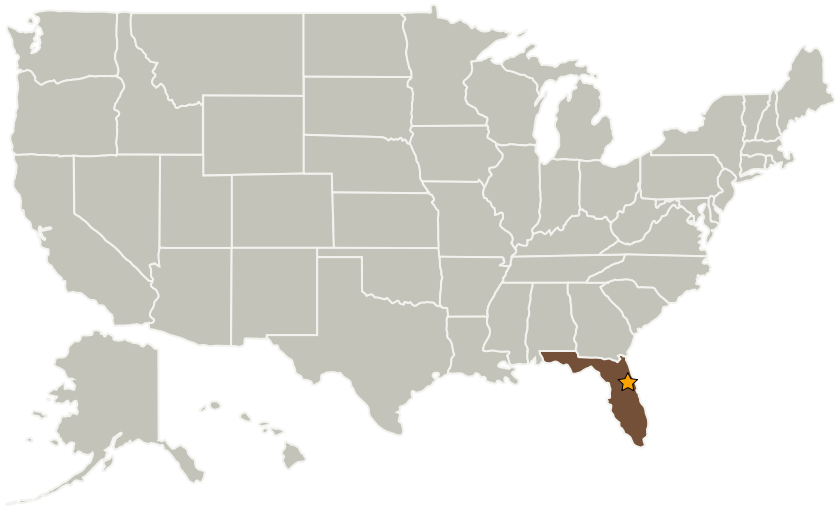
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Kennedy Space Center(KSC)	Lead Organization	NASA Center	Kennedy Space Center, Florida

Primary U.S. Work Locations
Florida

Stories

Graphene-based energy storage devices for space applications *(https://techport.nasa.gov/file/3218)*

Project Management

Program Director:
Michael R Lapointe

Program Manager:
Barbara L Brown

Project Manager:
Carlos I Calle

Principal Investigator:
Carlos I Calle

Co-Investigator:
Paul J Mackey

Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
  - TX03.2 Energy Storage
    - TX03.2.2 Electrochemical: Fuel Cells